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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/694,903

10/29/2003

Hideki Okumura

244619US2S CIP

4526

22850

7590

06/18/2004

OBLON, SPIVAK, MCCLELLAND, MAIER & NEUSTADT, P.C.
1940 DUKE STREET
ALEXANDRIA, VA 22314

EXAMINER

ERDEM, FAZLI

ART UNIT

PAPER NUMBER

2826

DATE MAILED: 06/18/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/694,903

Applicant(s)

OKUMURA ET AL.

Examiner

Fazli Erdem

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2826

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 24 April 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-26 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-7 and 26 is/are allowed.
- 6) ☐ Claim(s) _____ is/are rejected.
- 7) ☒ Claim(s) 12, 13, 15, 18-20 and 23-25 is/are objected to.
- 8) ☒ Claim(s) 8-11, 14, 16, 17, 21 and 22 are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 8/14/2003.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Allowable Subject Matter

1. Claims 1-7 and 26 allowed.
2. Claims 12, 13, 15, 18-20 and 23-25 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.
3. The following is a statement of reasons for the indication of allowable subject matter:
Prior art failed to establish a trench isolation structure with two layer insulating structure with the required melting point relationship between them.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 8-11 rejected under 35 U.S.C. 103(a) as being unpatentable over Lin et al. (US 2002/0182824) in view of Lu et al. (6,008,540)

Regarding Claims 8-11, Lin et al. disclose a method of forming shallow trench isolation where in Fig. 2H it is disclosed that a trench is formed in semiconductor substrate 200. Trench further comprises a liner oxide layer 208 on the sidewalls of the trench, a first insulating layer 210a and a second insulating layer of 212b inside the trench. Lin et al. fail to disclose the required pore/particle size relationship between the first insulating and the second insulating

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layers. However, Lu et al. disclose an integrated circuit dielectric and method where in Fig. 5, it is disclosed a two layer insulating layer with first layer having a bigger size pores/particles 512 than the gap fill layer of 520.

It would have been obvious to one of having ordinary skill in the art at the time the invention was made to include the required relationship between the first and the second insulating layers inside the trench in Lin et al. as taught by Lu et al. in order to have a trench isolation structure with higher reliability.

5. Claims 14, 16, 17, 21, and 22 rejected under 35 U.S.C. 103(a) as being unpatentable over Lin et al. (US 2002/0182824) in view of Lu et al. (6,008,540) further in view of Gaynor (6,566,243)

Regarding Claims 14, 15, 17, 21 and 22, Lin et al. disclose a method of forming shallow trench isolation where in Fig. 2H it is disclosed that a trench is formed in semiconductor substrate 200. Trench further comprises a liner oxide layer 208 on the sidewalls of the trench, a first insulating layer 210a and a second insulating layer of 212b inside the trench. Lin et al. fail to disclose the required pore/particle size relationship between the first insulating and the second insulating layers and also fail to disclose the required binder structure. However, Lu et al. disclose an integrated circuit dielectric and method where in Fig. 5, it is disclosed a two layer insulating layer with first layer having a bigger size pores/particles 512 than the gap fill layer of 520. Furthermore, Gaynor discloses a dielectric layer including silicalite crystals and binder and

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method for producing same for microelectronic circuits where in Figs. 1A-1D, the dielectric binder structure is disclosed.

It would have been obvious to one of having ordinary skill in the art at the time the invention was made to include the required relationship between the first and the second insulating layers inside the trench and also the required binder structure in Lin et al. as taught by Lu et al. and Gaynor respectively in order to have a trench isolation structure with higher reliability.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Fazli Erdem whose telephone number is (703) 305-3868. The examiner can normally be reached on M - F 8:00 - 5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan Flynn can be reached on (703) 308-6601. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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FE

June 10, 2004

A handwritten signature in black ink, consisting of a stylized, cursive 'N' followed by a horizontal line extending to the right.

NATHAN J. FLYNN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2826